BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

Patent
Attorney's Docket No. 007198-536

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	
	)	
Wing Kin CHAN	)	Group Art Unit: 3732
	)	
Application No.: 10/631,892	)	Examiner: Unassigned
	)	
Filed: August 1, 2003	)	Confirmation No: 9815
	)	
For: COMBING DEVICE WITH ADJUSTABLE TEETH SPACING	)	

CLAIM FOR CONVENTION PRIORITY

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

The benefit of the filing dates of the following prior applications in the following foreign countries is hereby requested, and the right of priority provided in 35 U.S.C. § 119 is hereby claimed:

Hong Kong Short-Term Patent Application No. 02106602.5
Filed: September 6, 2002; and

Hong Kong Short-Term Patent Application No. 03100284.2
Filed: January 11, 2003.

In support of this claim, enclosed are certified copies of the prior foreign applications. These applications are referred to in the oath or declaration. Acknowledgment of receipt of these certified copies is requested.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

Date: 2-2-04

By: _____
James A. LaBarre
Registration No. 28,632

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

香港特別行政區政府知識產權署專利註冊處
Patents Registry, Intellectual Property Department
The Government of the Hong Kong Special Administrative Region

知識產權署
Intellectual Property Department

PATENTS ORDINANCE
Chapter 514
Laws of the Hong Kong Special Administrative Region

The attached is a true copy of the Short-term Patent Application No. 02106602.5, which is still pending.

Dated this 4th day of August 2003.

(YIP CHIU YING RITA)
Intellectual Property Examiner
for Registrar of Patents

INTELLECTUAL PROPERTY DEPARTMENT

Patents Form P6
Version 2002
Fee No. 6

Patents Ordinance
(Chapter 514)

For Official Use
RECEIVED 2002 SEP -6 PM 4:47 專利及外觀設計註冊處 PATENTS & DES. INS REGISTRIES Date of receipt
Application No. 02106602-5
Accorded filing date -6 SEP 2002

Request for Grant of a Short-Term Patent

Patents Ordinance sections 113, 116, 125
Patents (General) Rules sections 58, 74

(See the notes on the last page of this form)

01	**Your reference**	9868441:P/D:HALE:sk
02	**Applicant's details** *(see note (4)(a))*	
	Name *(underline surname)*	CHAN, Wing Kin
	Name in Chinese *(if applicable)*	陳永堅
	Address	Block A-C, 4/F., Wing Hin Factory Building, 31-33 Ng Fong Street, San Po Kong, Kowloon
	Telephone	
	Fax	
	Kind of incorporation Country of incorporation State of incorporation *(if applicable)*	
03	Title of invention *(see note (4)(b))* English	**COMBING DEVICE WITH ADJUSTABLE TEETH SPACING**
	Chinese	see (2)

04 **Details of International Patent Classification** *(see note (5))*	IPC Code A45D	IPC Edition No. 7
05 Use of micro-organisms *(tick the appropriate box)* (a) Does the invention require the use of a **micro-organism** for its performance?	☐ Yes ☒ No	
(b) If you have ticked "Yes", please indicate whether the micro-organism is available to the public at the date of filing of the application; and	☐ Yes ☐ No	
whether the micro-organism is described in the application or the specification of the patent in such a manner as to enable the invention to be performed by a person skilled in the art.	☐ Yes ☐ No	
(c) If you have ticked "No" in **both** boxes in (b), please give the following details: Name and address of the depositary institution where a culture of the micro-organism is deposited	Name: Address:	
Date of deposit *(Day/Month/Year)*		
Accession No. of the deposit		
(section 73 and Schedule 1, Patents (General) Rules)		
06 Details of international application If the short-term patent application is based on (a) International Application No.		
(b) International Filing Date *(Day/Month/Year)*		
(c) International Publication No.		
(d) International Publication Date *(Day/Month/Year)*		
(e) Date of entry into the national phase in the People's Republic of China or Date of issuance of the National Application Notification by the State Intellectual Property Office *(tick the appropriate box and enter the date in the space provided)*	☐ _____ *(Day/Month/Year)* ☐ _____ *(Day/Month/Year)*	

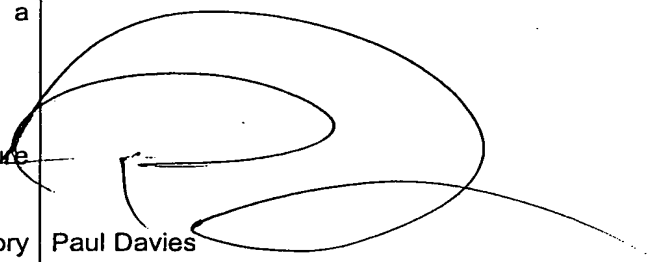
	(f) Application No. of the Chinese patent application (if known) *(section 125, Patents Ordinance and section 78, Patents (General) Rules)*	
07	**Details of earlier application** If the application is divided or derived from an earlier Hong Kong application	Patents Ordinance
	(a) Section under which an earlier application is claimed *(see note (6))* *(tick the appropriate box)*	☐ section 116 ☐ section 55
	(b) Earlier Application No.	
	(c) Earlier Application Filing Date *(Day/Month/Year)*	
08	**Details of the priority application** If a statement of claim of priority under section 111, Patents Ordinance is made *(sections 58(5)(c), 69, Patents (General) Rules)*	**Statement**

Country	Priority Application No.	Priority Application Filing Date

09	**Details of inventor** *(see note (4)(a))* *(see note (7))*	
	Name *(underline surname)* Name in Chinese *(if applicable)*	CHAN, Wing Kin 陳永堅
	Address	Block A-C, 4/F., Wing Hin Factory Building, 31-33 Ng Fong Street, San Po Kong, Kowloon
10	**Non-prejudicial disclosure** If the applicant is making a claim regarding non-prejudicial disclosure under section 109, Patents Ordinance, please provide a statement giving details relating to such disclosure. *(see note (8))*	**Statement**

Name and place of the exhibition or meeting	Opening date of the exhibition or meeting	Date of first disclosure

11	If a **request for deferral of grant** under section 119, Patents Ordinance is required, please tick the box and enter the period of such deferral. *(the period of deferral should not exceed 12 months)* *(if the box is not ticked, it will be taken that deferral of grant is not requested)*	☒ Request for deferral of grant up to 06/09/2003 *(Day/Month/Year)*
12	**Enter the no. of sheets for any of the following documents you are filing with this form**	No. of sheets
	(a) Continuation sheet for the request	
	(b) Description	19 ~~20~~
	(c) Claim(s)	4
	(d) Drawing(s)	10
	(e) Abstract *(in both English and Chinese)*	1 (in English)
	(f) Priority document(s)	
	(g) Translation of the priority document(s)	
	(h) Search Report	
	(i) Translation of the Search Report	
	(j) In the case of an international application, copy of :	
	(i) the international application as published by the International Bureau	
	(ii) the international search report	
	(iii) translation as published by the State Intellectual Property Office	
	(iv) publication of information by the State Intellectual Property Office concerning the international application	
	(k) Statement of inventorship on Patents Form P7 in accordance with section 113(2)(c), Patents Ordinance and section 65, Patents (General) Rules *(see note (7))*	
	(l) Others *(please specify)*	

13	**Name of agent** *(if you have one)* Address for service in Hong Kong Telephone Fax Agent's code *(if known)*	Deacons 3rd-7th, 18th & 29th Floors, Alexandra House, Central Hong Kong 2825 9336 (Hans Lee) 2810 0431
14	I/We request the Registrar to grant a short-term patent. Signature Name of signatory Official capacity of signatory Date *(Day/Month/Year)*	 Paul Davies Patent Attorney 06/09/2002

Notes

(1) *Application on this form should be made in English. (Chinese forms are available if you wish to use Chinese.) The official language in which an application is filed is used as the language of proceedings in all proceedings before the Registrar.*

(2) ***Please complete this form in black ink or by typing.***

(3) *If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part. Any continuation sheet should be attached to this form.*

(4) (a) *If the name of the applicant and inventor are not in Roman letters, you need to give a transliteration in Roman letters.*

(b) *You need to state the title of the invention in both* ***English and Chinese****.*

(5) *Please give the designation of the classification of the invention according to the International Patent Classification up to the subclass level, also indicating the edition no. of the IPC used.*

(6) *A claim of earlier application date may be made under :*

(a) *section 116, Patents Ordinance for divisional application;*

(b) *section 55, Patents Ordinance for new application filed on court order upon determination of right to patent after grant.*

(7) *If the applicant is not the sole inventor or the applicants are not the joint inventors, a statement identifying the inventor(s) and indicating the derivation of the applicant's entitlement to exercise his right to the short-term patent shall be made on Patents Form P7 and a sufficient no. of copies of the form should be filed to enable the Registrar to send one to each inventor who is not one of the applicants (section 113(2)(c), Patents Ordinance and section 65, Patents (General) Rules).*

(8) *Please refer to section 109, Patents Ordinance and sections 58(5)(e), 58(5)(f), 70, Patents (General) Rules for such claim of non-prejudicial disclosure.*

(9) *Please remember to sign and date the form.*

(10) ***Use of individual's personal data:*** *Personal data provided by means of this form will be used by the Intellectual Property Department and can be disclosed for purposes relating to the administration of the Patents Ordinance (Cap. 514). The personal data required by this form is necessary for processing your application. You can obtain information regarding access to and alteration of your personal data in accordance with the Patents Ordinance (Cap. 514) and Patents (General) Rules (Cap. 514C) by contacting the Registrar of Patents.*

COMBING DEVICE WITH ADJUSTABLE TEETH SPACING

FIELD OF INVENTION

This invention relates generally to hair care means such as hair care attachments, devices and apparatuses and, more particularly, to hair care attachments, devices and apparatuses with means for combing hair, including combs and hairbrushes. More specifically, although of course not limiting thereto, this invention relates to a hair care device with combing means for coupling as an attachment to a hair care apparatus with an air blower. This invention also relates to a hair care apparatus with an air blower and a combing attachment with an adjustable spacing between the teeth.

BACKGROUND OF THE INVENTION

Hair care devices with means for combing hair are widely used for general hair care such as combing, smoothing and tidying hair which has become messy. These types of hair care apparatuses are also used to perform hair styling as well as removing dirt and dis-entangling greasy and lumpy hair.

US Patent 5,729,907 describes such a hair care device as an attachment for a hair dryer with a comb and a heat transmissive plate for simultaneously drying and straightening one's hair.

US Patent 3,939,850 describes a combined hair comb and dryer device having baffles arranged to focus the warm hair moving through the device towards the hair as the hair is moving through the comb.

United Kingdom Publication No. GB 2,365,335 describes a hair care apparatus with a combined hair dryer and comb for drying and straightening hair.

Hair care apparatuses and devices having means for combing hair, such as the ones described above, usually include a plurality of elongated teeth distributed at and overhanging the front portion of the main housing of the devices or apparatuses. In use, the elongated teeth are disposed intermediately between the scalp and the handle portion of the main housing of the apparatuses or devices. Known hair care attachments, devices and apparatuses with such combing characteristics usually suffer from the common shortcoming that the teeth spacing between adjacent teeth is fixed which means hair of all thickness has to be treated with the same device, or, alternatively, or different attachments, devices or apparatuses must be used in order to achieve optimal styling, caring or treatment to hair of different thickness or characteristics. Hence, it will be highly desirable if there can be provided attachments, devices or apparatuses with combing features having adjustable teeth spacing to suit individual need in order to provide optimal hair styling, caring or treatment without requiring separate devices for different individuals. Such devices or apparatuses should be relatively simple and easy to use without requiring complicated or careful adjustment steps.

OBJECT OF THE INVENTION

It is therefore an object of the present invention to provide hair care attachments, devices and apparatuses having combing means with adjustable teeth spacing to adapt to different hair thickness to cater for the hair quality of individuals. It is also an object of this invention to provide an attachment for hair care apparatuses or a hair care device or apparatus with combing means having adjustable teeth spacing as well as means for providing other hair care features such as hair blowing, straightening or styling.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a hair care device including a main housing, a first comb member, a second comb member, and teeth spacing adjusting means, each of said first and second comb members including a plurality of generally parallel and elongated teeth extending from a base portion, said first and second comb members being disposed on said main housing such that the elongated teeth on said first and second comb members are generally distributed along a first direction and the teeth on said first and said second comb members generally parallel, said first and said second comb members being translatable relative to each other along said first direction, wherein the relative translation of said first and second comb members along said first direction will cause the elongated teeth on one comb member to transverse the space between adjacent teeth on the other comb member to vary the effective teeth spacing of said

device, said teeth spacing adjusting means controls the relative translation between said first and second comb members.

Preferably, said teeth on said first and second comb members generally extend along a second direction, said second direction being non-parallel to said first direction.

Preferably, said second direction being generally orthogonal to said first direction.

Preferably, said at least some of said teeth are tufts of bristles.

Preferably, said teeth spacing adjusting means include means to gradually translate one of said comb members relative to the other comb member.

Preferably, the teeth spacings on said first and second comb members are generally equal.

Preferably, said device is a hair brush or hair brush attachment wherein said teeth are formed from bristles and said second direction along which said bristles extend being radial from the longitudinal axis of said brush.

Preferably, said teeth spacing adjusting means includes a rotatable wheel with its plane of rotation disposed non-perpendicular to said first direction.

Preferably, said plane of rotation of said rotatable wheel being parallel to said first direction.

Preferably, a complete rotation of said rotatable wheel about said first direction as the axis of rotation will result in a cycle of reciprocating motion of one of said comb members along said first direction.

Preferably, said rotatable wheel is connected to a turning knob disposed outside said main housing via a shaft supported by said main housing.

Preferably, said gradual translation of said one of said comb members being driven by a screw-threaded rotary shaft, the longitudinal axis of said screw-threaded shaft being parallel to said first direction.

Preferably, said teeth spacing adjusting means further include means to maintain said one of said comb members at pre-determined positions along said first direction.

Preferably, said pre-determined positions correspond to discrete settings of the effective teeth spacing of said device.

Thus, according to the present invention, there are provided hair care attachments, devices and apparatuses with the features set out above, wherein the teeth spacings on said first and second comb members are generally equal.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the present invention will be explained in further detail by way of example and with reference to the accompanying drawings, in

which:-

Fig. 1 is a top plan view of a comb attachment embodying a first preferred embodiment of the present invention with the teeth of the first and second combing members overlapping.

Fig. 2 is a side view of the attachment of Fig. 1 viewing from the left side,

Fig. 3 is a side view of the attachment of Fig. 1 viewing from the right side,

Fig. 4 is a cross-sectional view of the attachment of Fig. 1 taken along the sectional line A-A,

Fig. 4A is an enlarged view of the circled portion of Fig. 4,

Fig. 4B is an enlarged view showing the cross-section, upper (left) and under (left) of the adjustment knob,

Fig. 5 is a cross-sectional view of the hair attachment of Fig. 1 taken along the sectional line B-B,

Fig. 5A is an enlarged view of the circled portion of Fig. 5.

Fig. 5B is a partial cross-sectional view of the hair attachment of Fig. 1 taken along the line C-C of Fig. 4,

Fig. 6 is a top plan view showing the comb sub-assembly detached from the rest of the attachment,

Fig. 6A is the front view of Fig. 1 with the comb members removed,

Fig. 7 illustrates the operation of the adjustment knob to vary the teeth spacing of the attachment of Fig. 1,

Fig. 7A is an enlarged view showing the circled portion of Fig. 7,

Fig. 8 is a top plan view of a comb attachment embodying a second preferred embodiment of the present invention,

Fig. 9 is a cross-sectional view of the comb attachment of Fig. 8 taken along the line A-A,

Fig. 9A is partial cross-section of the attachment of Fig. 8 taken along the line C-C,

Fig. 9B is a front view of the attachment of Fig. 8 with the comb sub-assembly removed,

Fig. 9C is an enlarged view of the circled portion showing in more detail the engagement means being connected with the lower portion of the pivotal cock,

Fig. 10 is a cross-sectional view of the attachment of Fig. 8 along the line B-B,

Fig. 11 is a rear view of the comb attachment of Fig. 8 revealing in more detail the pivotal cock for moving the engagement tab,

Fig. 12 is a front view of a hair comb of a third embodiment of the present invention with the comb members removed,

Fig. 13 is a top view of the hair comb of Fig. 12 with the comb members intact,

Fig. 14 is a cross-sectional view of the hair comb of Fig. 13 taken along the line A-A of Fig. 12,

Fig. 15 is the side view of a fourth embodiment of the present invention configured as a hair comb,

Fig. 16 is a top view of the hair comb of Fig. 15,

Fig. 17 is a cross-sectional view of the hair comb of Fig. 15 exposing the more important features of the teeth adjustment means,

Fig. 17A is a cross-sectional view of a modified version of the hair comb of Fig. 15 exposing the fixed and movable comb members as well as the teeth adjusting means,

Fig. 18 is a cross-sectional view of a hairbrush showing a fifth preferred embodiment of the present invention,

Fig. 19 is a cross-sectional view of a hair brush showing a sixth preferred embodiment of the present invention,

Fig. 19A is a cross-sectional view taken along the line A-A of Fig. 19.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figs. 1 to 7A, there is shown a first preferred embodiment of a hair care device of the present invention configured as a comb attachment which can be used with, for example, a hair-dryer or a hair blower. The comb attachment **1** includes a main housing **10** and a comb sub-assembly **20**. The comb sub-assembly includes a first comb member **30**, a second comb member **40** and teeth width adjustment means **50**. Each of the first comb member **30** and the second comb member **40** includes a plurality of elongated teeth **31, 41** extending from a base portion **32, 42**.

The elongated teeth **31, 41** on the same comb member are generally parallel to each other with spacing **33, 43** separating adjacent elongated teeth and defining the pitch of the corresponding comb member. The teeth spacings or the pitch **33, 43** between adjacent elongated teeth on the same comb member are preferably substantially identical.

In addition, the teeth on the same comb member preferably have the same teeth width so that teeth of the same width are regularly distributed along the length of the base portion of the respective comb members.

The elongated teeth **31, 41** are preferably rigid or semi-rigid and made of, for example, plastics, metal, bakelite, bone or the like. Of course, the elongated teeth can also be made of a flexible material such as soft plastics. Where the elongated teeth are made of plastics or metal, the elongated teeth and the

corresponding base portion can be integrally made from plastics by moulding or from metal by stamping or pressing.

As a variation, the elongated teeth can also be formed by tufts of bristles which are mounted on the base portion of the comb members as holders of the bristles. The first and the second comb members are mounted on the front portion of the main housing **10** so that the comb members **30, 40** are relatively movable in order to change the effective teeth spacing of the comb attachment. This will assist to provide, for example, optimal teeth spacing for hair of corresponding specific thickness.

Since the hair being combed will have to pass through the effective teeth spacing of the comb attachment **1**, in order to perform appropriate combing, the optimal teeth spacing should be adjustable so that it is neither too wide to allow too many hair to pass through a single pitch at the same time nor too narrow which makes the comb difficult to move through the hair.

In order to adjust the effective teeth spacing or pitch, the first **30** and the second **40** comb members of the present embodiment are disposed in a relatively translatable configuration so that the elongated teeth of one comb member (the "first comb member") can be moved towards and away from the teeth member of the other comb member (the "second comb member") in order to cover a portion of the spacing between adjacent teeth of the second comb member. As a result of the relative movements between the first comb member **30** and the second comb

member **40**, part of the teeth spacing on the first, movable, comb member **30** is in turn covered by the elongated teeth on the second, fixed, comb member **40**, therefore changing the overall effective teeth spacing **34** of the comb attachment, as illustrated in Fig. 7A.

For the avoidance of doubt, throughout this description, the effective teeth spacing means the spacing between adjacent elongated teeth minus the spacing being covered by the teeth on another comb member.

Since the teeth pitches as defined by adjacent teeth on the same comb member are generally parallel to each other, it is preferred that the adjusted teeth spacings are also generally parallel to each other and also generally parallel to the elongated teeth of the comb members. As such, it is preferred that the comb members are relatively movable along a first direction so that the elongated teeth on the moving comb member will remain parallel to that of the other comb members during the movements, although at a different level.

In general, the first direction will be at an angle or inclination to the orientation or lengthwise axis of the elongated teeth, which is along a second direction, so that the effective teeth spacing **34** can be conveniently adjusted. In the present preferred embodiments, the comb members are arranged so that the orientation of the elongated teeth is generally orthogonal to the direction of relative movements between the comb members. Thus, the first and the second directions in this embodiment are generally orthogonal and the effective teeth spacing is

adjusted by relative movements of the comb members transversal to the second direction. Of course, the first and second direction can be non-orthogonal and can incline at an appropriate angle.

To provide further convenience, the adjustable comb sub-assembly is mounted on a head portion **11** which is detachable from the main housing **10**. As can be seen from Fig. 3, a latching means **12** is provided on the head portion **11** to facilitate detachability between the comb sub-assembly and the main housing.

Turning more particularly to Figs. 4 to 7A, the teeth spacing adjustment means and its operation will be explained in further details.

Referring more specifically to Figs. 4 to 5C, the second comb member **40** is fixedly connected to the main housing **10** or, more specifically, to the head portion **11** of the main housing **10** with the teeth generally extending along the second direction from the base portion **42**. The head portion **11** of the main housing is also substantially rigid and includes a top, a bottom, sideguards and a front aperture exposing the comb teeth. The sideguards **111, 112** together form a bracket enclosing the teeth members and extend beyond the tip of the comb teeth to keep away hair outside the region being combed from entering the teethed regions. The first, movable, comb member **30** is supported by the second comb member **40** in a movable manner by supporting arrangements **13** which are shown in more detail in Fig. 5A.

The supporting arrangement **13** includes a rivet **131** which connects the first and the second comb members by its stem and traps the comb members by its heads. In order that the first comb member **30** can be movable along the second direction, an elliptical aperture with an opening slightly larger than the diameter of the rivet stem is formed on the first comb member **30**. The elliptical aperture is sized so that the first comb member **30** can be translatable along the first direction while being retained by the rivet head.

A separator which is a washer **132** in the present example is placed between the comb members to reduce contact area and therefore fiction. To adjust the range of movement and to avoid the rivet from clamping directly on the first comb member, a metal liner **133** is introduced to surround the portion of this stem above the plane of the second comb member **40**. This metal liner **133** trims the space between the rivet stem and the aperture on the first comb member for an appropriate range of translation along the first direction, as well as elevating the head of the rivet above the base portion of the first comb member **30**.

In order to move and also to control the gradual movement of the first comb member **30**, the first comb member **30** is connected to a teeth spacing adjustment means **50** which includes a movement mechanism. The movement mechanism includes a rotary member having a circular head **51** and a screw-threaded shaft portion **52**. The shaft portion **52** is rotatably supported on the left sideguard **111** of the main housing.

To restrict the longitudinal movement of the rotary member relative to the sideguard **111**, a retention member which is a clip **53**, preferably engaging on a circular groove on the shaft **52**, is disposed adjacent to the sideguard of the head portion **11**. A nut **54** which is engaged on the threaded portion of a shaft **52** is engaged with an indentation formed on the base portion **32** of the first comb member **30**. The engagement between the indentation and the nut **54** is preferably in a close-fitted manner so that any longitudinal translation of the nut **54** along the first direction as a result of the rotation of the circular head **51** of the rotary member will result in translational movement of the first comb member along the first direction.

In order to restrict further, unwanted, movements of the movable comb member **30** once a preferred teeth spacing has been selected and set, corresponding holding means are formed on the underside of the rotary adjustment knob **51** and the outside of the sideguard **111**. This holding means **510** includes a small dome-shaped indentation **511** formed on the underside of the rotary adjustment knob **51** for engagement with a correspondingly shaped and postioned stud **512** on the outside of the sideguard **111**. The holding means **510** can be released from engagement by pulling the rotary adjustment knob **51** away from the sideguard **111** or by depressing the sideguard **111** carrying the rotary member towards the other sideguard **112**. The residual resilience of the substantially rigid head portion will then allow this dis-engagement of the holding means.

In order to allow the first comb member to be retained in a plurality of pre-determined positions corresponding to pre-determined effective teeth spacings, a plurality of holding indentations **511** are distributed on the underside of the rotary knob **51** for engagement with the stud **512**.

Turning now to the operation of the teeth spacing adjustment means, when the rotary head is rotated, the threaded portion of the shaft **52** will also rotate, thereby causing the nut **54** to move towards or away from the rotary head **51** along the threaded shaft. Because of the engagement of the nut **54** with the indentation on the base portion **32** of the first comb member, the first comb member **30** will be brought to move along the longitudinal direction of the shaft **52**. Therefore, by disposing the shaft **52** along the first direction, the first comb member can be moved along the first direction with the elongated teeth on the first comb member moving generally parallelly to the elongated teeth on the second comb member.

As the present comb attachment is designed for coupled operation with an hair-dryer or hair blower, one end **13** of the main housing is generally tubular and shaped corresponding to the barrel exit of a compatible hair-dryer or hair blower. In order to divert excessive warm or hot air to move away from the hair if the air outlet of the attachment is blocked while combing, downstream air diverting outlets **14** are disposed adjacent to the head portion of the main housing so that the warm or hot air can be diverted to avoid overheating the scalp.

Referring to Figs. 8 to 11, there is shown a second preferred embodiment of a comb attachment of the present invention. Similar to the first preferred embodiment, this comb attachment **2** also includes a main housing **10** and a comb sub-assembly **20**. The comb sub-assembly includes a first comb member **30**, a second comb member **40** and teeth width adjustment means **60**. Each of the first comb member **30** and the second comb member **40** includes a plurality of elongated teeth **31, 41** extending from a base portion **32, 42**. In general, the two embodiments are identical except for the teeth width adjustment means **60**. Similar to the first preferred embodiment, the movable first comb member is riveted to the fixed, second, comb member **40** with an elliptical aperture formed on the first comb member **30** with the same peripheral parts.

Instead of a rotary means for adjusting the effective teeth spacing, teeth width spacing adjustment means **60** in the present embodiment includes a push-tab arrangement more particularly shown in Figs. 9, 9B, 9C and 10. The push-tab arrangement includes a push-tab member **61** disposed on the top surface of the head portion **11** and an engagement member with an engagement protrusion **66** disposed underneath the top surface for selection of pitch width by a user. The engagement member includes a pair of bifurcated legs extending through the head portion **11**. An elongated hook with a protrusion **66** extending towards the underside of the head portion **11** is formed at the end of each of the bifurcated legs. The underside of the push-tab member is connected to a fork member **62** for driving engagement with a pivotal cock member **63** which is in turn connected to

the first comb member **30**. The cock member **63** is pivotally mounted about an axis **64** on the head portion of the main housing **10** and includes a first end in driving engagement with the first comb member **30** and a second end in driving engagement with the fork member **62** of the push-tab **61**. Holding means are correspondingly formed on the top portion of the main housing and the underside of the push-tab **61**. In the present embodiment, the holding means include a plurality of indentations **65** and the engagement members. The indentations **65** are formed on the main housing and arranged corresponding to discrete effective teeth spacing. The engagement means includes at least a protrusion **66** for engaging with the selected indentation in order to lock the first comb member **30** at a pre-determined position corresponding to a pre-determined effective teeth spacing. Thus, a user can select one of the discrete effective teeth spacings by selecting the positions "1", "2", "3" and "4" to conveniently select the effective teeth spacing for hair caring. The selected position will be reasonably fixed by the engagement between the protrusion **66** with the corresponding indentation **65**. This engagement can be released by pushing the push-tab member **61** away from the selected position along the second direction and the resilience of the push-tab arrangement.

Turning now to the operation of the teeth spacing adjustment means, when the push-tab is moved along the second direction, the fork member **62** disposed underneath the push-tab **61** will drive the second end of the cock which causes a pivotal movement of the first end of the cock about the pivotal axis **64**, thereby

moving the first comb member **30** along the second direction to adjust the effective teeth spacing.

Referring to Figs. 12 to 14, there is shown a third preferred embodiment of the present invention configured as a comb **3**. In general, the comb **3** includes also includes a main housing **10** and a comb sub-assembly **20**. The comb sub-assembly includes a first comb member **30**, a second comb member **40** and teeth width adjustment means **50**. Each of the first comb member **30** and the second comb member **40** includes a plurality of elongated teeth **31, 41** extending from a base portion **32, 42**. In this preferred embodiment, the relative disposition of the comb members and the teeth spacing adjustment means **50** are generally identical to that of the first embodiment with appropriate corresponding modifications which are obvious to persons skilled in the art.

Referring to Figs. 15 to 17, there is shown a fourth preferred embodiment of the present invention configured as a comb **4** similar to that of the third embodiment but employing the teeth spacing adjustment means **60** of the second preferred embodiment.

Referring to Fig. 17A, there is shown a modified version of the comb of Figs. 15 to 17. This specific embodiment is generally identical to the embodiment of Figs. 15 to 17 except that the movable comb member **30** is disposed between a left fixed comb member **401** and a right fixed comb member **402**. The disposition of a movable comb member **30** between the two fixed comb members **401, 402**

alleviates or relieves the stress on the movable comb member **30** since the stress is negotiated and shared firstly by the adjacent fixed comb members.

Referring to Fig. 18, there is shown a fifth preferred embodiment of the present invention configured as a hairbrush **5**. In this preferred embodiment, the hairbrush includes a plurality of radially extending bristles which are organized into a first group of movable bristles **531** and a second group of fixed bristles **532**. The movable bristles are connected to a shaft or base portion **540** which is movable along the longitudinal direction corresponding to the first direction in the earlier embodiments. The group of movable bristles **531** are translatable along the longitudinal axis (the "first direction") of the hairbrush by connection to the teeth width adjustment means similar to those described in the earlier preferred embodiments. In this specific embodiment, a rotary wheel **550** with a radial slot for engaging with a stud **560** connected to the shaft **540** is provided to move the second bristle group along the axial, or first direction are illustrated as an example.

Referring to Figs. 19 and 19A, there is shown a sixth preferred embodiment of the present invention also configured as a hairbrush **6** which includes a movable comb member **630** with teeth members **631** extending radially from the base portion **632** of the comb members. The hairbrush **6** also includes a fixed comb member **640** which are fixed to the housing **10** of the hairbrush and with teeth members **641** extending from the base portion **642** of the fixed comb member. In contrast to the hairbrush of Fig. 18, the teeth members **631** of the movable comb member **630** of this specific embodiment are disposed intermediate between a first

641A and a second 641B rows of teeth members extending radially from the base portion 642 of the fixed comb member. Similar to the embodiment of Fig. 17A, this sandwiching of the movable comb member between two rows of fixed teeth members alleviates or relieves the stress from the movable teeth members for more effective and more durable brushing.

In the above description, the same numerals have been used to refer to parts which are common to the various embodiments without loss of generality.

While the present invention has been explained by reference to the preferred embodiments described above, it will be appreciated that the embodiments are only examples provided to illustrate the present invention and are not meant to be restrictive on the scope and spirit of the present invention. This invention should be determined from the general principles and spirit of the invention as described above. In particular, variations or modifications which are obvious or trivial to persons skilled in the art, as well as improvements made on the basis of the present invention, should be considered as falling within the scope and boundary of the present invention. Furthermore, while the present invention has been explained by reference to comb attachments, combs and hairbrushes, it should be appreciated that the invention can apply, whether with or without modification, to other hair care devices, attachments or apparatuses.

CLAIMS

1. A hair care device including a main housing, a first comb member, a second comb member, and teeth spacing adjusting means, each of said first and second comb members including a plurality of generally parallel and elongated teeth extending from a base portion, said first and second comb members being disposed on said main housing such that the elongated teeth on said first and second comb members are generally distributed along a first direction and the teeth on said first and said second comb members generally parallel, said first and said second comb members being translatable relative to each other along said first direction, wherein the relative translation of said first and second comb members along said first direction will cause the elongated teeth on one comb member to transverse the space between adjacent teeth on the other comb member to vary the effective teeth spacing of said device, said teeth spacing adjusting means controls the relative translation between said first and second comb members.

2. A hair care device according to claim 1, wherein said teeth spacing adjusting means includes a rotatable wheel with its plane of rotation disposed non-perpendicular to said first direction.

3. A hair care device according to claim 2, wherein said plane of rotation of said rotatable wheel being parallel to said first direction.

4. A hair care device according to claim 2, wherein a complete rotation of said rotatable wheel about said first direction as the axis of rotation will result in a cycle of reciprocating motion of one of said comb members along said first direction.

5. A hair care device according to claim 2, wherein said rotatable wheel is connected to a turning knob disposed outside said main housing via a shaft supported by said main housing.

6. A hair care device according to claim 5, wherein said turning knob includes a screw-threaded shaft, the longitudinal axis of said shaft being parallel to said first direction.

7. A hair care device according to claim 1, wherein said teeth on said first and second comb members generally extend along a second direction, said second direction being non-parallel to said first direction.

8. A hair care device according to claim 7, wherein said second direction being generally orthogonal to said first direction.

9. A hair care device according to claim 1, wherein said at least some of said teeth are tufts of bristles.

10. A hair care device according to claim 1, wherein said teeth spacing adjusting means include means to gradually translate one of said comb members relative to the other comb member.

11. A hair care device according to claim 10, wherein said gradual translation of said one of said comb members being driven by a screw-threaded rotary shaft, the longitudinal axis of said screw-threaded shaft being parallel to said first direction.

12. A hair care device according to claim 11, wherein said one of said comb members being driven by said screw-threaded rotary shaft via a nut, said nut being rotatable about a plane which is generally orthogonal to said first direction.

13. A hair care device according to claim 10, wherein said teeth spacing adjusting means further include means to maintain said one of said comb members at pre-determined positions along said first direction.

14. A hair care device according to claim 13, wherein said pre-determined positions correspond to discrete settings of the effective teeth spacing of said device.

15. A hair care device according to claim 1, wherein the teeth spacings on said first and second comb members are generally equal.

16. A hair care device according to any of the claims 1 to 15, wherein said main housing include a hollow member with an air-inlet, an air-outlet, and a neck portion interconnecting said air-inlet and said air-outlet, said comb members being disposed at said air-outlet with said teeth pointing away from said air-outlet.

17. A hair care device according to claim 16, wherein said main housing includes means for coupling to the nozzle of a hair care apparatus with a blower.

18. A device according to claim 1, said device is a hair brush or hair brush attachment wherein said teeth are formed from bristles and said second direction along which said bristles extend being radial from the longitudinal axis of said brush.

19. A hair care apparatus including an air blower and a hair care device of any of the preceding claims.

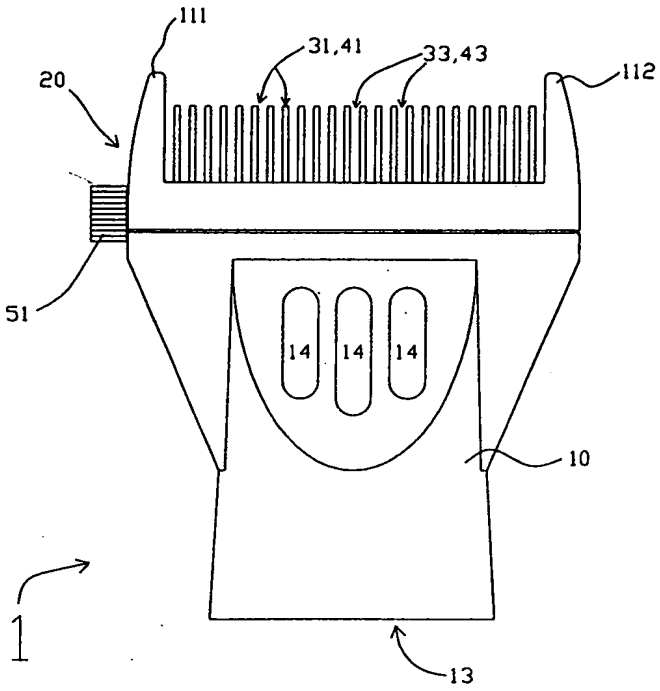


FIG. 1

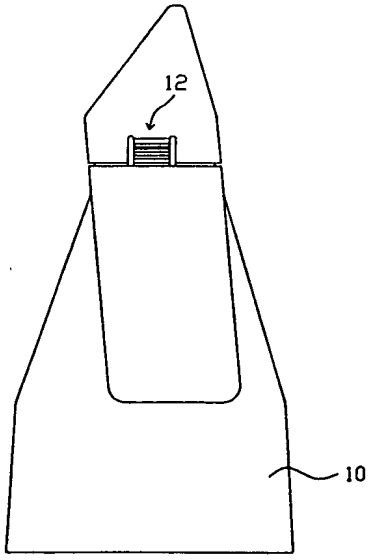


FIG. 3

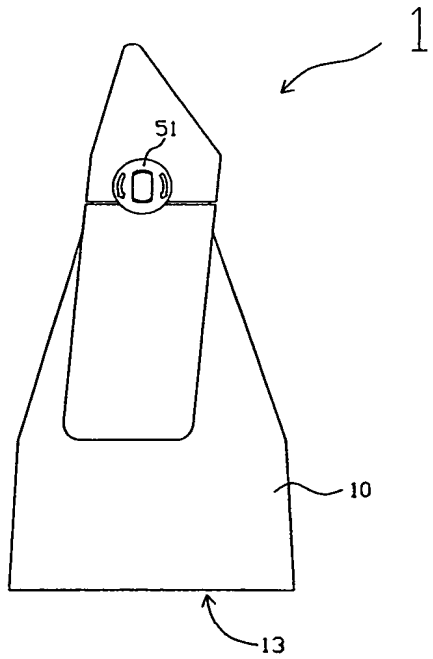


FIG. 2

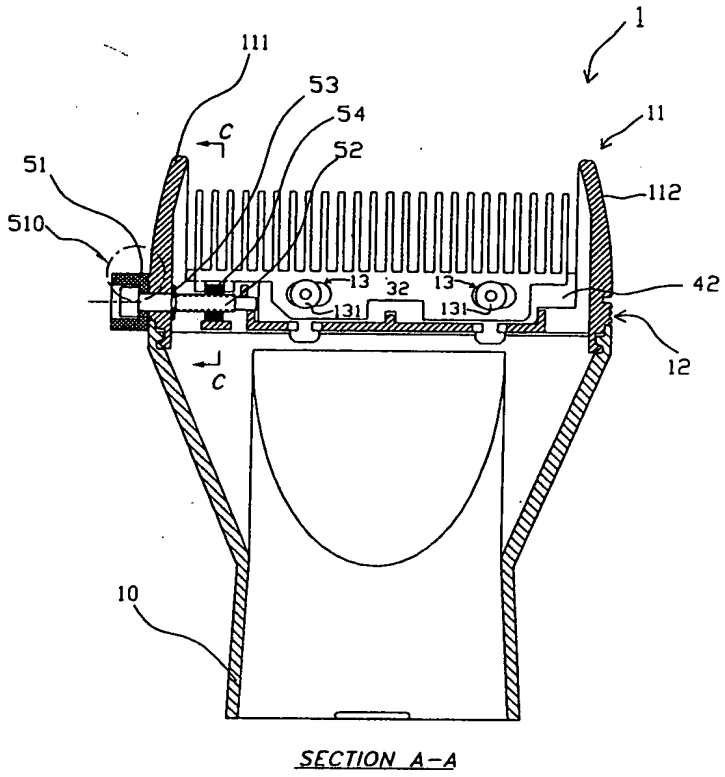


FIG. 4

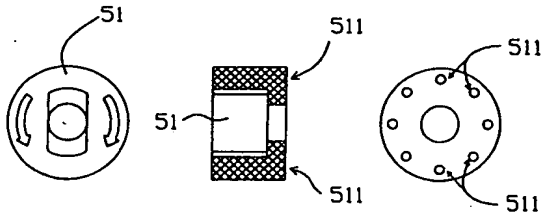


FIG. 4B

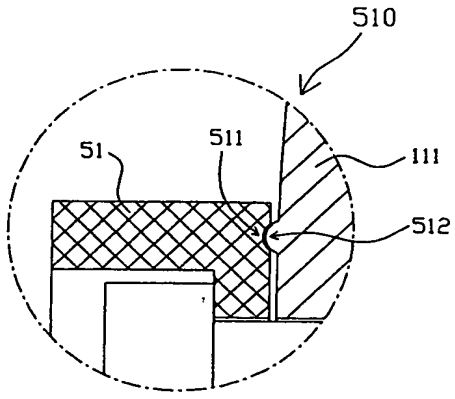
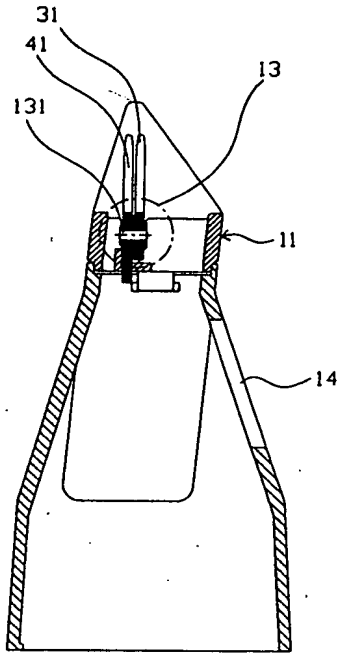


FIG. 4A



SECTION B-B

FIG. 5

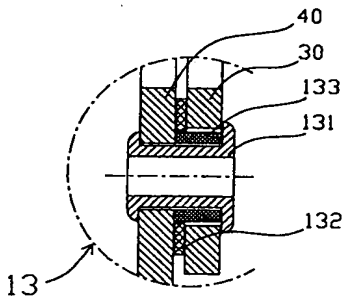
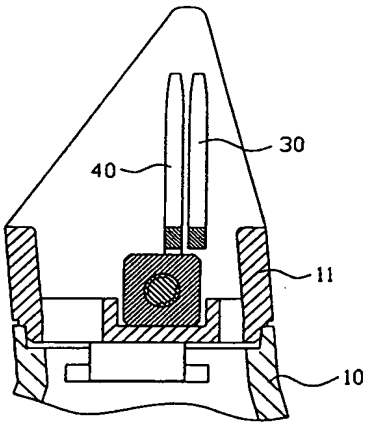
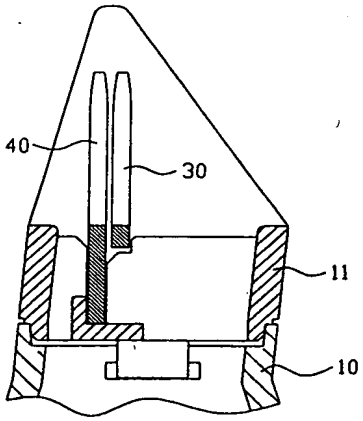


FIG. 5A



SECTION C-C

FIG. 5B



SECTION D-D

FIG. 5C

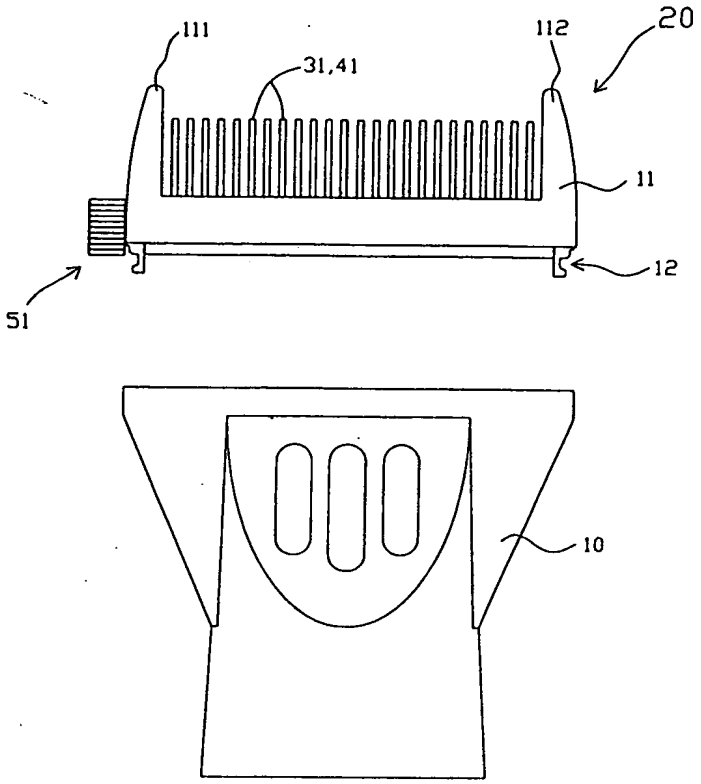


FIG. 6

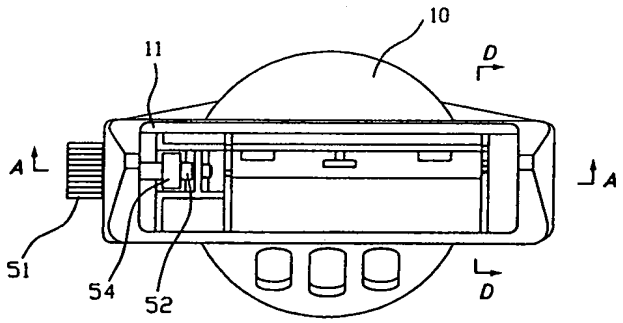


FIG. 6A

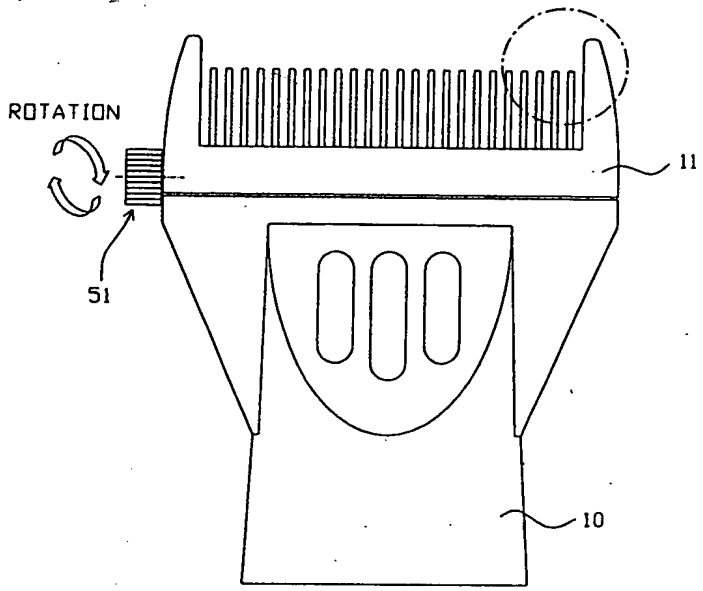


FIG. 7

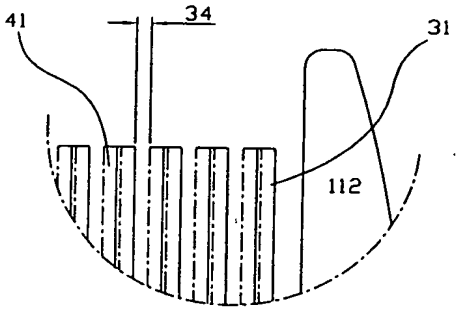


FIG. 7A

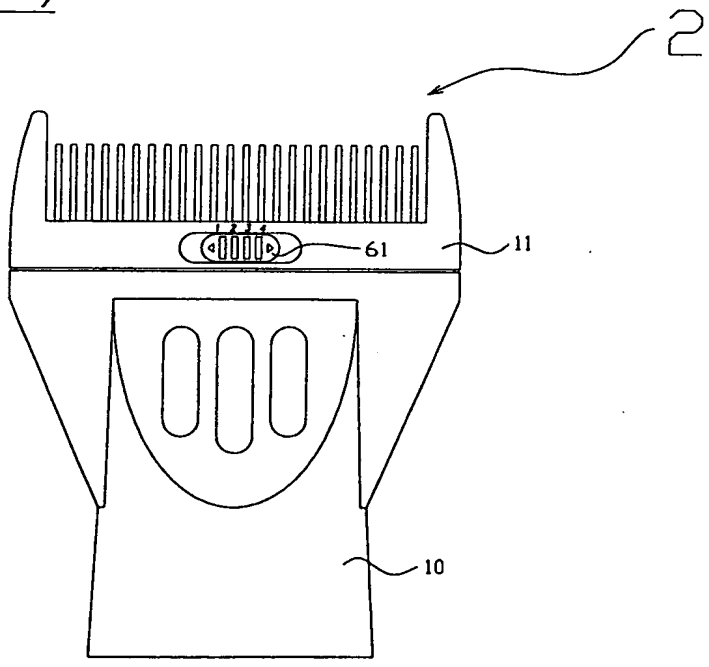
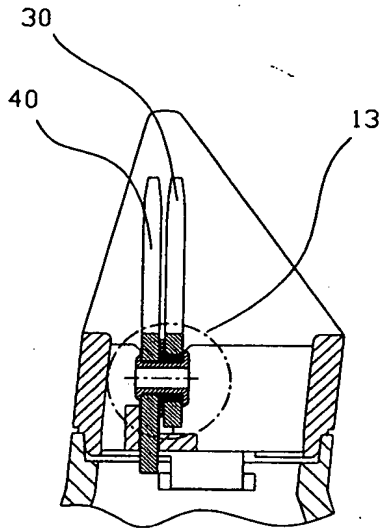
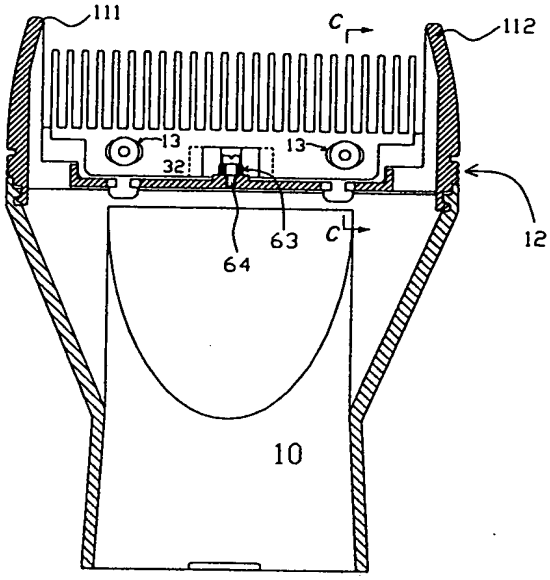


FIG. 8



SECTION C–C

FIG. 9A



SECTION A–A

FIG. 9

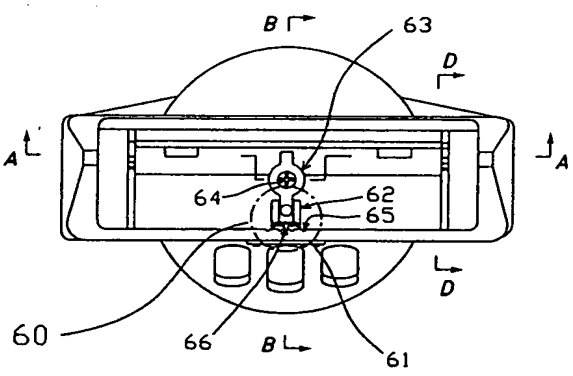


FIG. 9B

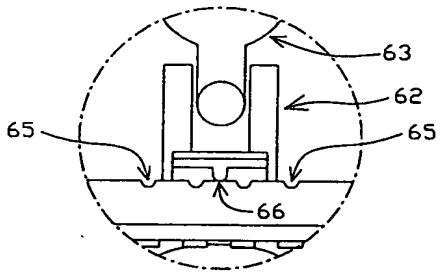


FIG. 9C

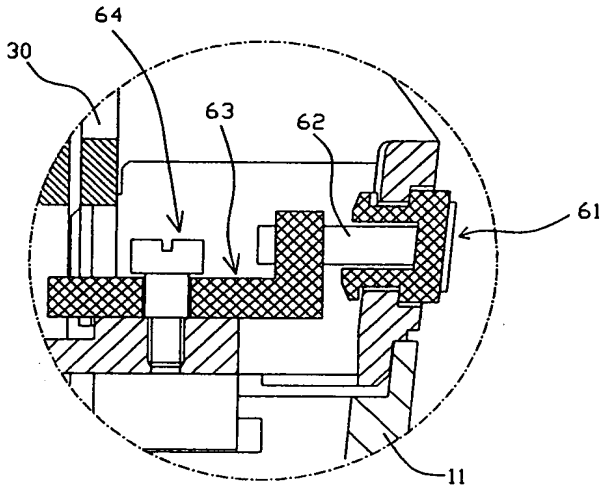
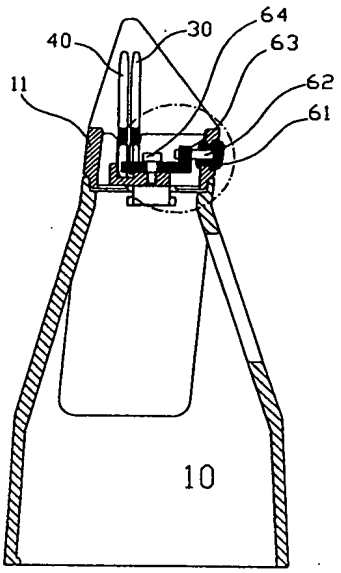


FIG. 10A



SECTION B-B

FIG. 10

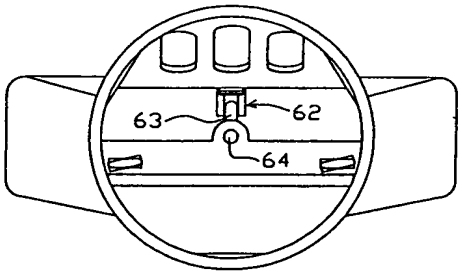


FIG. 11

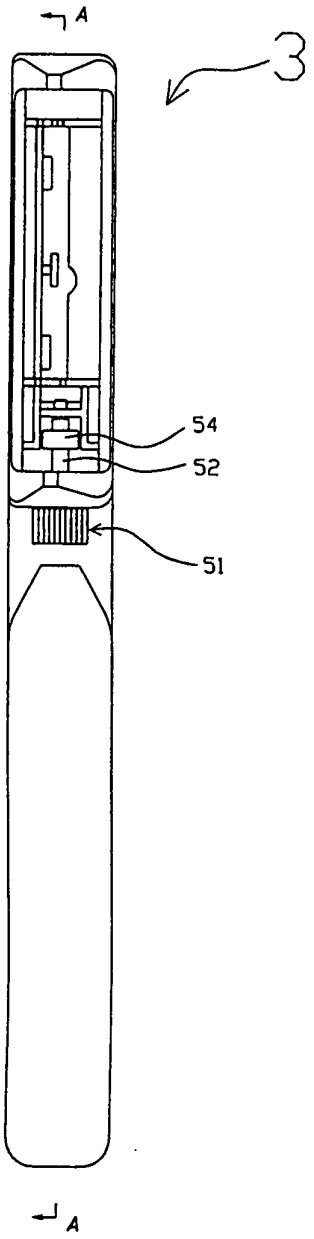


FIG. 12

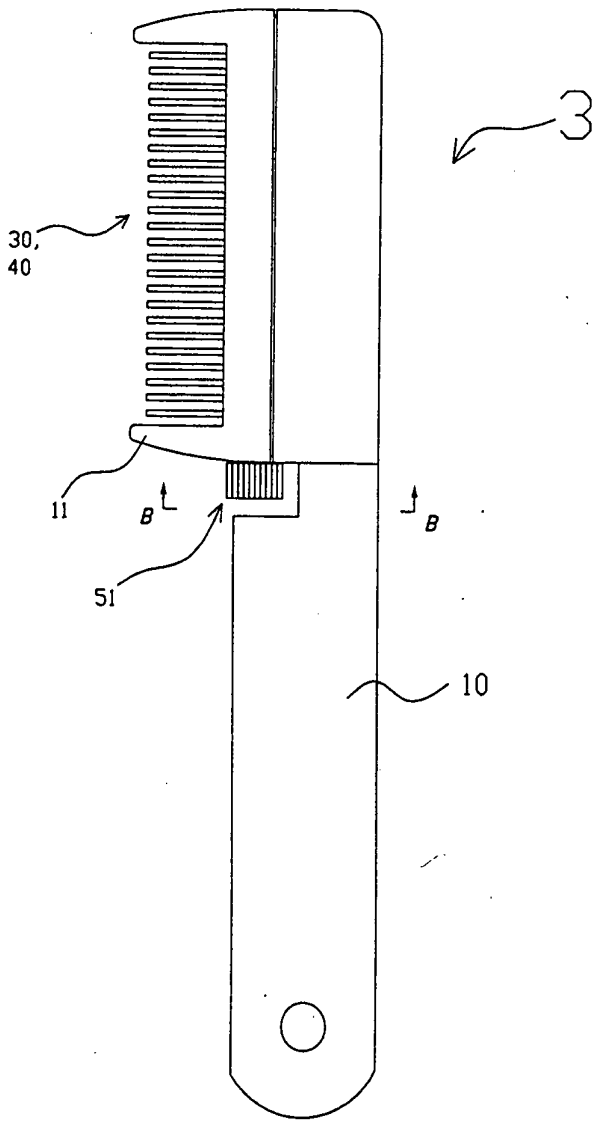


FIG. 13

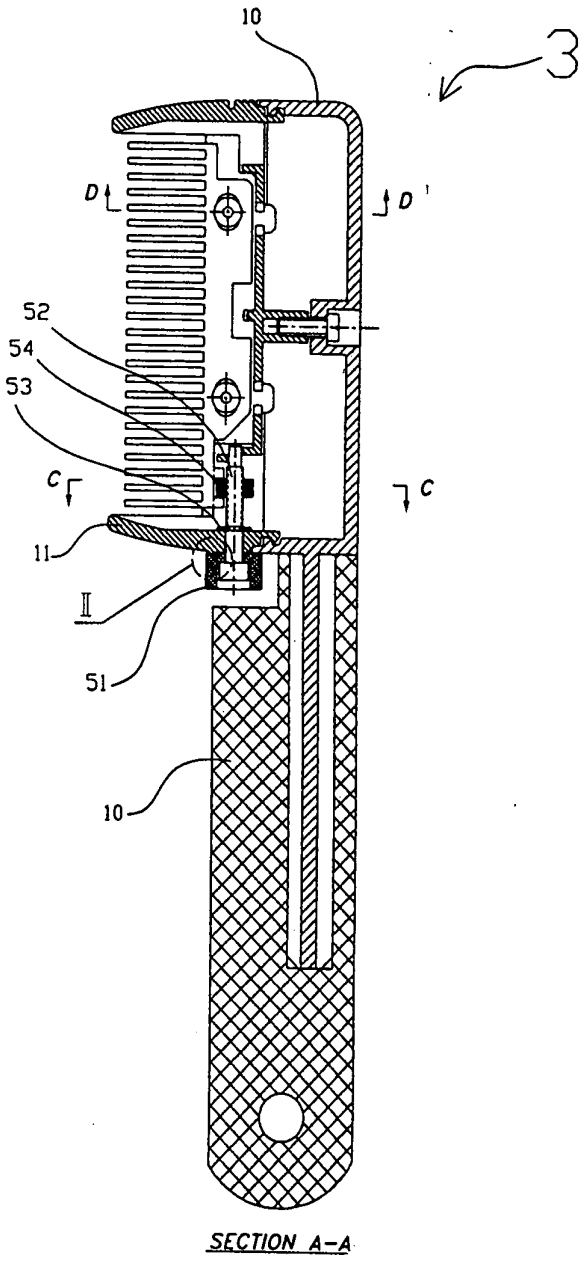


FIG. 14

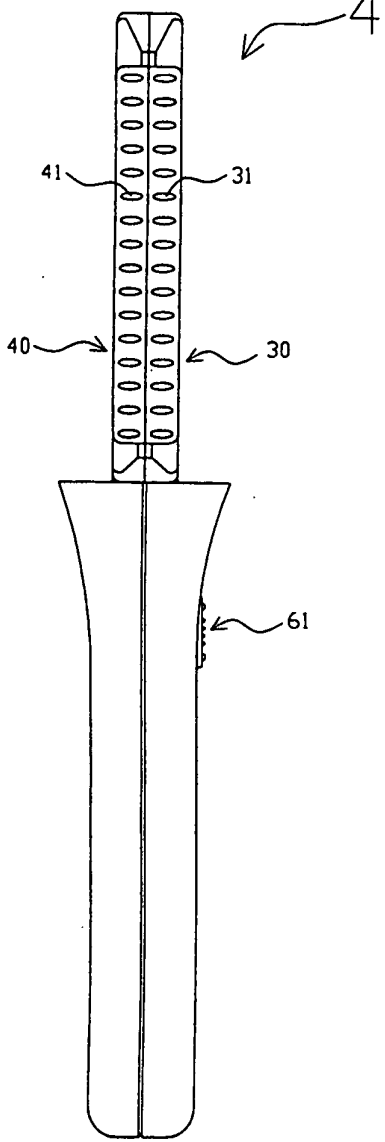


FIG. 15

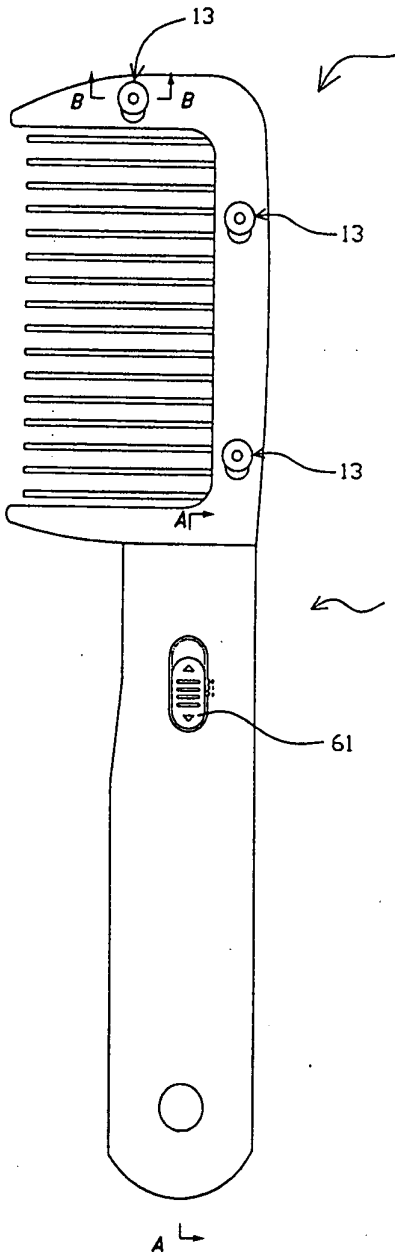
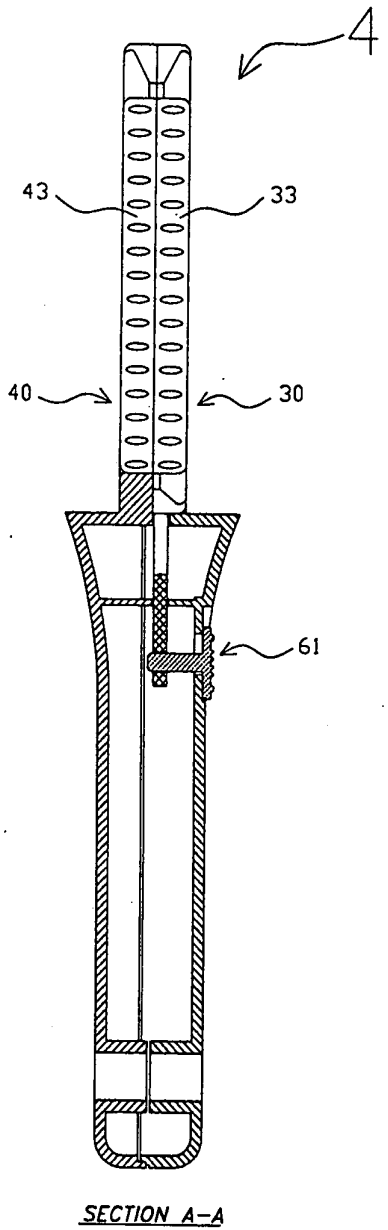


FIG. 16



SECTION A-A

FIG. 17

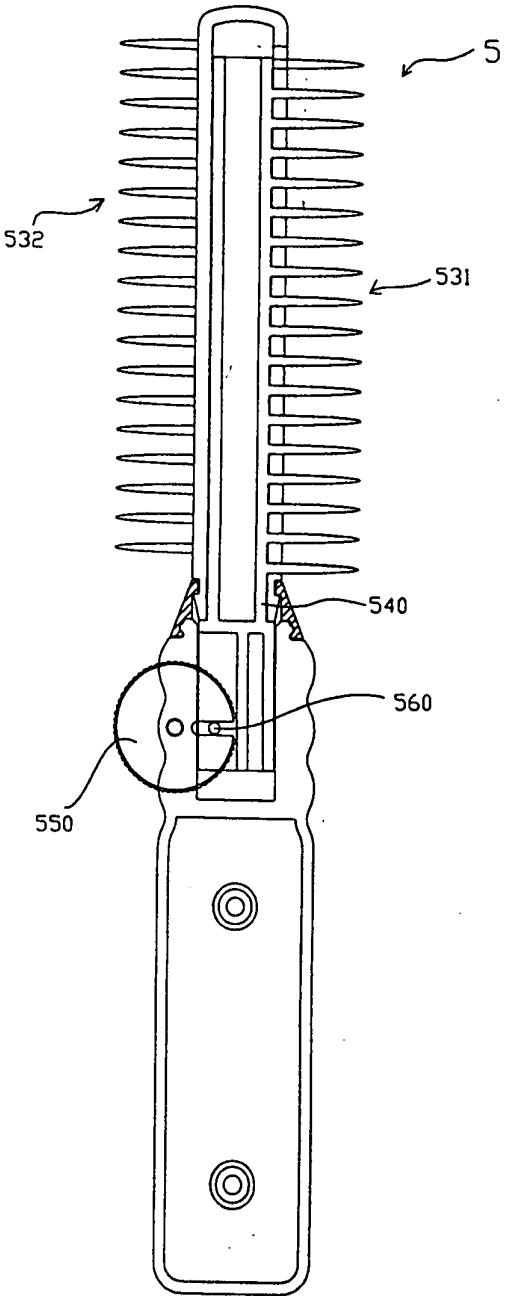


FIG. 18

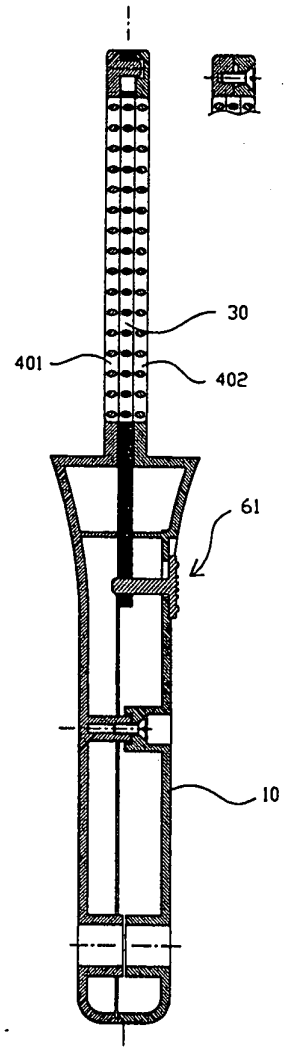


Fig 17A

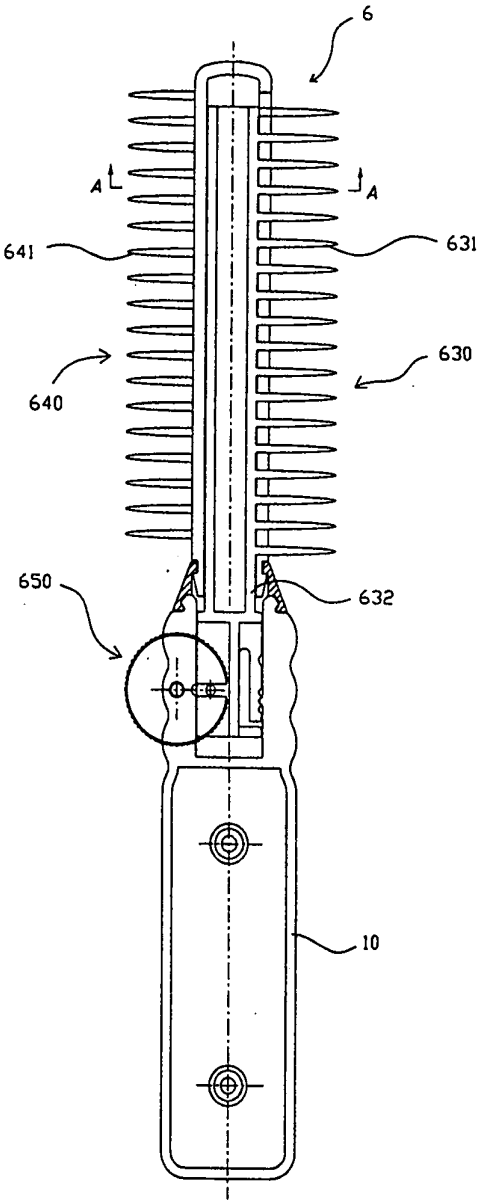


Fig 19

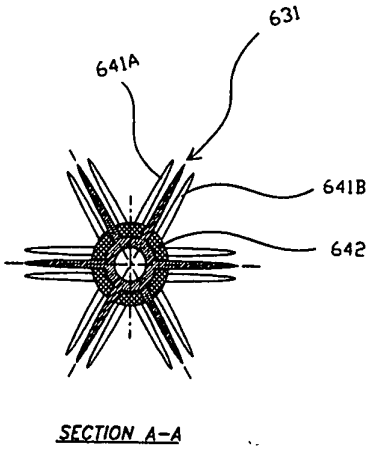


Fig 19A

COMBING DEVICE WITH ADJUSTABLE TEETH SPACING

ABSTRACT

A hair care device including a main housing, a first comb member, a second comb member, and teeth spacing adjusting means, each of said first and second comb members including a plurality of generally parallel and elongated teeth extending from a base portion, said first and second comb members being disposed on said main housing such that the elongated teeth on said first and second comb members are generally distributed along a first direction and the teeth on said first and said second comb members generally parallel, said first and said second comb members being translatable relative to each other along said first direction, wherein the relative translation of said first and second comb members along said first direction will cause the elongated teeth on one comb member to transverse the space between adjacent teeth on the other comb member to vary the effective teeth spacing of said device, said teeth spacing adjusting means controls the relative translation between said first and second comb members.